TWO NEW SUBSPECIES OF *MICROSERIS LACINIATA* (ASTERACEAE) FROM THE SISKIYOU MOUNTAINS

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ABSTRACT

Microseris laciniata subsp. ***siskiyouensis*** and subsp. ***detlingii*** are described as endemics of the floristically "central" region of the Siskiyou Mountains of Oregon and adjacent California. These taxa have novel morphological features differentiating them from the related *Microseris laciniata* subsp. *laciniata* and subsp. *leptosepala* also found in this region. The populations are kept separate by allopatry and by adaptation to different edaphic conditions, and thus have different vegetation associations. Intermediate populations occur where pairs of taxa meet and the ecological differences are modified by habitat disturbance.

RESUMEN

Se describen ***Microseris laciniata*** subsp. ***siskiyouensis*** y subsp. ***detlingii*** como endemismos de la región floristica "central" de las Montañas Siskiyou de Oregón y la adyacente California. Estos taxa tienen caracteristica morfológicas que los diferencian de sus parientes *Microseris laciniata* subsp. *laciniata* y subsp. *leptosepala* que también se encuentran en esta región. Las poblaciones se mantienen separadas por alopatria y por adaptación a condiciones edáficas diferentes, y así tienen diferentes asociaciones de vegetación. Aparecen poblaciones intermedias donde contactan pares de taxa y las diferencias ecológicas se modifican por alteraciones del hábitat.

INTRODUCTION

The perennial species of *Microseris* subgen. *Scorzonella* were last reviewed taxonomically by Chambers (1957) in preparation for the generic treatment in Abrams and Ferris' *Illustrated Flora of the Pacific States* (Chambers 1960). An attempt was made to compartmentalize the extensive variation of *M. laciniata* into two subspecies, subsp. *laciniata* and subsp. *leptosepala*, based principally on the shape, width, and pubescence of the involucral phyllaries and on differences in distribution. The species ranges from western Washington south through Oregon to just north of San Francisco in California, principally west of the Cascade Range but extending east to Klamath and Lake Counties, Oregon, and Siskiyou, Lassen, and Modoc Counties, California. The subsp. *leptosepala* occurs in the more coastal parts of the Coast Range, especially in the Klamath Mountains region, but is also in northwestern Oregon including the lower Willamette Valley. The subsp. *laciniata* is more interior, being the common form

from Pierce County, Washington south to Douglas County, Oregon and from southern Humboldt County to Sonoma County, California, as well as in the Great Basin part of the range. Intergradent forms are frequent, especially in the Willamette Valley and Curry County, Oregon, the northern California Coast Range, and in populations east of the Cascade Range.

In this earlier study, additional puzzling variation was found in the Siskiyou Mountains of southwestern Oregon and adjacent California, but it could not be resolved using the few available herbarium specimens from this rugged and poorly explored region. This variation was lumped into *Microseris howellii*, which we now know to be a narrowly endemic species which is limited to exposed serpentine sites in the Illinois River Valley of Oregon. Field research by the present author suggested that two additional forms of *M. laciniata* should be recognized taxonomically from the Siskiyou region, and their ranges have recently been mapped through the collecting efforts of a number of interested colleagues (see Acknowledgments section). These entities have been presented informally (Chambers 1993) but have not yet been validly published.

Some diagnostic features of these new entities were presented by Mauthe et al. (1982) and compared with 9 other samples of *Microseris laciniata* representing much of the species' range. Capitulum and fruit morphology was the principal object of this investigation. It was suggested that there was "a rather small number of unlinked genes allowing for a rather free recombination of character states" and that "the characters that distinguish these two groups of populations (subsp. *laciniata* and subsp. *leptosepala*) recombine freely" in some populations. Crossing experiments (Pires 1980) show that hybrids between taxa in the *M. laciniata* complex are no less pollen-fertile than intrataxon crosses. An important result of these and previous studies of *M. laciniata* (Bachmann and Price 1979) was the validation of pappus part number as a highly consistent morphological feature of these two named subspecies. In both, the number varies among cypselae of single heads but is always constrained from 5 to 10. Frequencies of average pappi numbers follow patterns of rather simple Poisson distributions between 5 and 10, as would result from the interaction of a minimum of two pairs of genes (Bachmann & Chambers 1978).

Both of the newly recognized subspecies have average pappi numbers that are above 10–up to 16.6 in subsp. *detlingii* and 20.3 in subsp. *siskiyouensis*. In other respects, these two new subspecies are very different in morphology and in edaphic and vegetation associations. The newly available suite of collections of these taxa shows that each has an area of intergradation with an adjacent subspecies of *M. laciniata*—subsp. *detlingii* with subsp. *laciniata*, and subsp. *siskiyouensis* with subsp. *leptosepala*. Hence they are parts of a single genetic complex and are best placed as subspecies rather than as separate species. Their addition to the flora of the Siskiyou Range means that this region is an unusually rich center of diversity for perennial *Microseris*, containing 5 recognized

taxa. These taxa have defined distribution patterns and characteristic habitat preferences, which allow them to persist as separate populations in this limited geographic region.

Microseris laciniata (Hook.) Sch. Bip. subsp. **siskiyouensis** K.L. Chambers, subsp. nov. (**Figs. 1, 2, 3**). TYPE: U.S.A. CALIFORNIA. DEL NORTE CO.: Hwy. 199, 5.0 mi by road up the Smith R. from Patricks Ck. Guard Station, on a rocky diabase knob overlooking the river, in shallow soil covered by mosses, lichens, and *Selaginella* sp., with *Melica harfordii*, *Luina hypoleuca*, *Sedum* sp., 10 Jul 1964, *K.L. Chambers 2242* (HOLOTYPE: OSC; ISOTYPES: MO, NY, UC).

Microseride laciniato subsp. *leptosepalo* (Nutt.) K.L. Chambers similis a qua segmentis pappi numero 10–24 varians setis minute barbellatis differt; chromosomatum numerus $2n = 18$.

Perennial herbs with 1–3 fleshy biennial taproots; *stems* to 65 cm high, well-branched above, except on depauperate plants, leafy, the floral peduncles arising terminally and from leaf axils; *leaves* linear or narrowly lanceolate, attenuate, sometimes sparsely toothed or pinnatifid with narrow lobes; *involucres* 10–17 mm high, with a series of lanceolate inner phyllaries and a variable number of shorter outer ones ranging from linear to lanceolate-attenuate or deltoid-attenuate (Fig. 1B shows the narrowest type of outer phyllaries), both outer and inner series usually densely furfuraceous (that is, covered with the minute scaly trichomes that are a generic feature of *Microseris*), inner phyllaries usually lightly black-villous dorsally and minutely white-strigulose ventrally; *florets* 13–48+ in number, with yellow ligules 15–22 mm long; *cypselae* pale to dark brown, 3.5–5.5 mm long, 10-ribbed, the ribs usually smooth or lightly scabrous, often lightly hispid near the apex on outer fruits; *pappi* scales 10–24, 0.5–2.0 mm long, lanceolate to linear-lanceolate, white or brownish, bristles minutely barbellate, white.

In the region under discussion, subsp. *leptosepala* and subsp. *siskiyouensis* are practically indistinguishable in habit. Therefore, Figure 1 can represent either taxon. Cypsela and pappi are illustrated in Figure 2, with enlargements of the pappi to show the bristle differences from the scabrous-awned subsp. *leptosepala*, left, and the plumose-awned species *Microseris nutans* (Hook.) Sch. Bip. on the right. The bristle difference with subsp. *leptosepala* breaks down where the taxa are sympatric in western Curry Co., Oregon and Del Norte Co., California. Here both subspecies have barbellate bristles, and they are distinguished only by pappi number—5–10 per cypsela in subsp. *leptosepala*, 10–24 per cypsela in subsp. *siskiyouensis*.

Distribution.—*Microseris laciniata* subsp. *siskiyouensis* is limited to the Siskiyou Mountains in Del Norte and Siskiyou counties, California and Josephine and Jackson counties, Oregon. The most common habitat is in grassy openings of second growth woodlands, in non-serpentine soil or well-developed forest soil over serpentine bedrock. It also occurs on non-serpentine rock outcrops, as at the type locality. Frequently associated woodland species are *Pseudotsuga*

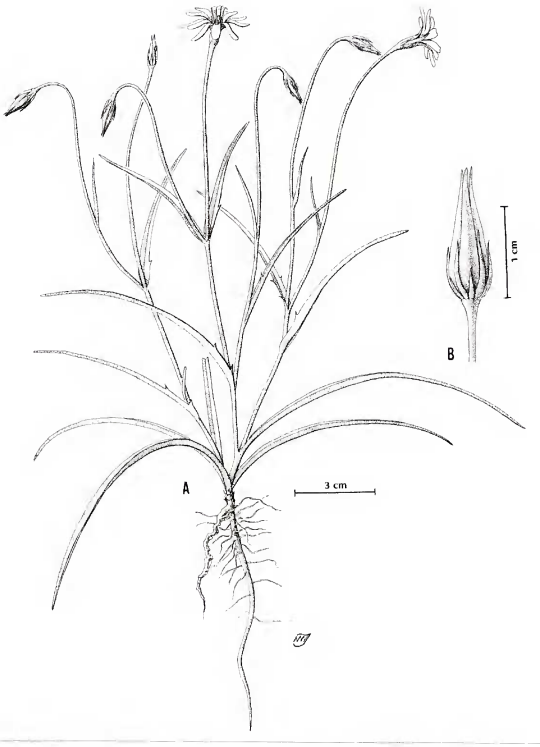

FIG. 1. *Microseris laciniata* subsp. *siskiyouensis*. **A.** Habit of plant at anthesis. **B.** Head with developing fruits.

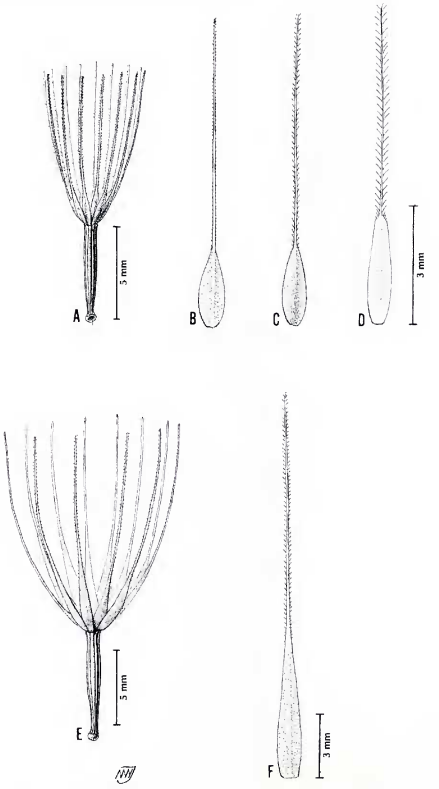

FIG. 2. Cypselae and pappi of various *Microseris* taxa. **A.** Cypsela of *M. laciniata* subsp. *siskiyouensis* bearing 15 pappus parts. **B.** Pappus part of *M. laciniata* subsp. *laciniata* or subsp. *leptosepala*, with scabrous bristle. **C.** Pappus part of *M. laciniata* subsp. *siskiyouensis*, with minutely barbellate bristle. **D.** Pappus part of *M. nutans*, with plumose bristle. **E.** Cypsela of *M. laciniata* subsp. *detlingii* bearing 12 pappus parts. **F.** Pappus part of *M. laciniata* subsp. *detlingii*, with minutely barbellate bristle.

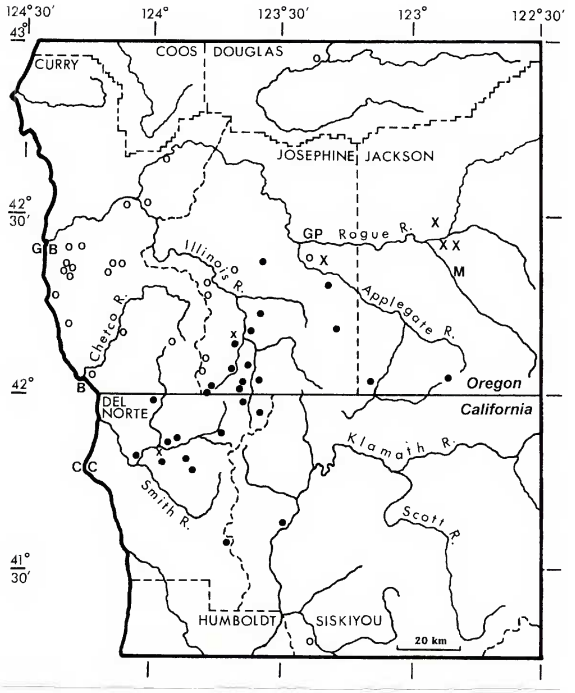

Fig. 3. Distribution of *Micraseris* taxa in the western Siskiyou Mountains. Black circles = *M. laciniata* subsp. *siskiyouensis*; open circles = *M. laciniata* subsp. *leptosepala*; small Xs = intergradent populations between these two taxa; large Xs = *M. laciniata* subsp. *laciniata*. Cities: B = Brookings; CC = Crescent City; GB = Gold Beach; GP = Grants Pass; M = Medford. *Microseris howellii* is omitted.

menziesii, *Pinus lambertiana*, *P. jeffreyi*, *Calocedrus decurrens*, *Quercus garryana*, *Q. kelloggii*, *Arbutus menziesii*, *Arctostaphylos canescens*, *Rhododendron macrophyllum*, and *Ceanothus integerrimus*. Elevations are 30–2100 m.

Flowering.—May–Jul, depending on habitat and elevation.

Figure 3 maps the known populations of subsp. *siskiyouensis*, represented by black circles, while the known localities for subsp. *leptosepala* in the Siskiyous are shown as open circles. The pattern of parapatry and the region of contact in western Josephine County are evident. Two sites have been identified, marked by small Xs, where intermediate populations are known, containing many plants with 10 or fewer pappus parts and others with average pappi numbers in the range of subsp. *siskiyouensis*. One such population, at Gasquet Flat, Del Norte County (see *Chambers 5168*, below) was well sampled by Mauthe et al. (1982), who reported the average numbers of pappi in a sample of 149 plants. The frequencies of plant averages, grouped by whole numbers, are as follows: 9–10: *56*; 10.1–11: *55*; 11.1–12: *15*; 12.1–13: *8*; 13.1–14: *8*; 14.1–15: *6*; 15.1–16: *1*. Although the genetics of pappi numbers are not known, one can speculate that this is a population of subsp. *leptosepala* showing a history of hybridization with subsp. *siskiyouensis*. The second site with an intermediate population, West Side Road in Josephine County (*Chambers 5522*, below), though not as well sampled, shows a similar range of pappi numbers between the two subspecies. For comparison, select plants in 10 populations of subsp. *siskiyouensis* more remote from subsp. *leptosepala* had the following average pappi numbers: 13.2, 15.0, 15.2, 15.5, 15.6, 16.8, 17.0, 17.3, 17.6, and 20.3. The large Xs in Figure 3 mark populations assignable to subsp. *laciniata*; these are discussed below under subsp. *detlingii*.

Collections of *Microseris laciniata* subsp. *siskiyouensis* mapped in Figure 3. **U.S.A. CALIFORNIA. Del Norte Co.:** Old Gasquet Toll Road by Middle Fork of Smith R., 1 Jun 1935, *Tracy 11223* (UC); State Line N of Monumental, 13 Jun 1936, *Tracy 15220* (UC); French Hill, 2 mi S of Gasquet, 20 Jun 1942, *Tracy 17191* (UC); intersection of Hayne's Flat Road, Coon Mtn., 27 Jun 1950, *Tracy 18991* (UC); head of Blue Ck. 1 mi E of Chimney Rock, 19 Jul 1950, *Tracy 19136* (UC); Smith R. on Hwy. 199, 9.7 mi NE of Hwy. 101, 5 Jul 1961, *Breedlove 680* (DS); Pine Flat, 26 Jun 1938, *VanDeventer 237* (JEPS); Old Gasquet Toll Road near Eighteenmile Ck., 26 Jun 1938, *VanDeventer 167* (JEPS); Gordon Mtn. N of Big Flat, 24 Jun 1952, *Munz 17729* (NY); Crazy Peak area on Road 49906-053, 1 Jun 1997, *Paetzel & Bell s.n.* (OSC); Rd. 40S03 S of Waldo, Six Rivers Natl. For. 1 mi S of border of Siskiyou Natl. Forest, 30 Jun 1973, *Denton 2916* (OSC, WTU); Old Gasquet Toll Road 2.7 mi up from Smith R. bridge at Gasquet, 11 Jul 1964, *Chambers 2246* (OSC); Old Gasquet Toll Road 4.7 mi up from Smith R. bridge at Gasquet, 11 Jul 1964, *Chambers 2247* (OSC). **Siskiyou Co.:** Klamath R. 2 mi N of Swillup Ck. Ranger Station, 1 Jun 1942, *Stebbins & Beetle 3273* (UC). **OREGON. Jackson Co.:** Collins Mtn. near Steamboat, 13 Jul 1950, *Whittaker 184* (WS); summit slopes of Big Red Mtn., 15 Jul 1950, *Whittaker s.n.* (WS). **Josephine Co.:** Old Gasquet-O'Brien Toll Road 10.1 mi NE of Patrick Ck. Road, 8 Jun 1962, *Breedlove 3193* (DS); northern city limits of Cave Junction, 9 Jun 1962, *Breedlove 3241* (DS); Waldo Junction, 18 May 1930, *Kildale & Kildale 9643* (DS); Takilma, 24 Jun 1918, *Peck 7955* (GH, WILLU); Murphy Ck. near Murphy, 12 Jul 1950, *Whittaker 155, 159* (WS); Illinois R. Valley SW of Cave Junction, to E of West Side Rd., 11 May 1989, *Brock 242* (OSC); valley of East Fork of Illinois R. by French Flat, 1 Jun 1988, *Kagan 6018801* (OSC); Illinois R. Valley, West Side Road S of Cave Junction, 4 Jun 1991, *Chambers 5609* (OSC); Illinois R. Valley, Rockydale Rd. 2.0 mi N of Waldo Rd. E of O'Brien, 15 Jun 1998, *Chambers 6113* (OSC); Waldo

Hill Lookout Rd. 1.6 mi S of Waldo, 15 Jun 1998, *Chambers 6123* (OSC); junction of Waldo Hill spur road with road to Sanger Pk., 3 Jul 1965, *Chambers 2364* (OSC).

Collections of *Microseris laciniata* subsp. *leptosepala* mapped in Figure 3 **U.S.A. CALIFORNIA. Del Norte Co.:** Gasquet Flat, alluvial flat in mixed evergreen woodland by the Smith R., T17N, R2E, S20, 24 Jun 1984, *Chambers 5168* (OSC). **OREGON. Curry Co.:** 10 mi N of Carpenterville, 7 Jul 1939, *Peck 20450* (WILLU); Brookings, 11 Jul 1919, *Peck 8790* (WILLU); Rogue River 5 mi below Mule Ck., 21 Jun 1917, *Peck 3502* (WILLU), Snow Camp Meadows, 3 Jul 1929, *Leach 2244* (ORE); Mine Cabin, Collier Trail, 28 Jun 1929, *Leach 2277* (ORE); near Agness, 25 Jun 1933, *Leach 4428* (ORE); Waldeens, 29 Jun 1934, *Leach 4700* (ORE); Pyramid Rock, 30 Jun 1934, *Leach 4701* (ORE); Vulcan Peak, T39S, R11W, S15, 23 Jun 1980, *Hess s.n.* (OSC); Agness road, 2 mi W of Illinois R. junction with Rogue R., 18 Jun 1984, *Stansell s.n.* (OSC); Signal Buttes E of Gold Beach, 23 Jun 1982, *Stansell s.n.* (OSC); Pine Point Forest Camp, T37S, R13W, S18, 27 Jun 1974, *Hawk s.n.* (OSC); above Wren Cabin, T37S, R14W, S12, 28 Jun 1993, *Ruttenhouse 1480* (OSC); 10 km S of Gold Beach, T37S, R14W, S24, 16 Jun 1980, *Sundberg 1098* (OSC); Fairview Meadow, T37S, R12W, S18, 11 Jul 1981, *Chambers 4872* (OSC); Gold Beach to Agness road 1.6 mi W of Illinois R. bridge, 23 Jun 1984, *Chambers 5162* (OSC). **Josephine Co.** Eagle Gap, 11 mi W of Selma, 23 Jun 1930, *Leach 2897* (ORE, WILLU); 7 mi W of O'Brien, T40S, R10W, S26, 14 Jun 1990, *Kagan s.n.* (OSC); Illinois R. road, T37S, R9W, S32, 31 May 1988, *Kagan 5318801* (OSC); Illinois R. valley W of Selma, T37S, R9W, S23, 19 Jun 1969, *White/Lillico 266* (OSC); old road to Buckskin Pk., T40S, R10W, S24, 11 Jul 1989, *Rolle 256* (OSC); Bolt Mtn. 9 mi SW of Grants Pass near Applegate R., 9 Jul 1996, *Mazzu s.n.* (OSC).

Microseris laciniata (Hook.) Sch. Bip. subsp. **detlingii** K.L. Chambers, subsp. nov. **(Figs. 2, 4, 5).** TYPE: U.S.A. OREGON, JACKSON CO.: Siskiyou Pass, S side on the old highway where it joins Hwy. 5, 2.1 mi N of Hilt exit, grassy openings in *Quercus breweri/Amelanchier pallida* brushland, in heavy clay soil on slope above road, 22 Jun 1967, *K.L. Chambers 2868* (HOLOTYPE: OSC; ISOTYPES: BRIT-SMU, CAS, MO, NY, RSA, UC, US, WS, WTU).

Microseride laciniato subsp. *laciniato* similis a qua marginibus foliorum plerumque integris caule non ramoso radice longissimo segmentis pappi numeris 9–19 varians squamis 4–9 mm setis minute barbellatis differt; chromosomatum numerus $2n = 18$.

Perennial herbs with 1–2 much elongated fleshy biennial taproots; *stem* erect, to 55 cm high, usually simple, leafy near the base; *leaves* lanceolate or oblanceolate, acute to attenuate, tapering below to a clasping, winged petiole, glabrous, entire or rarely sparingly dentate or pinnatifid, margins often undulate; *head* single on a terminal, naked or bracteate peduncle, a second peduncle sometimes arising from the axil of a lower leaf; *involucres* 13–25 mm high, the inner series of phyllaries equal, lanceolate, often black-villous dorsally, the outer phyllaries imbricate in several series, broadly lanceolate to elliptic or round, cuspidate to acuminate, glabrous, sometimes purple-spotted, the outermost 3–7 mm wide; *florets* 18–85+, with yellow ligules 18–22 mm long, often purple-striped dorsally; *cypselae* 5–9 mm long, gray to brown, 10-ribbed, ribs smooth or hispid on outer fruits; *pappi* scales 9–19, 4–9 mm long, lanceolate, silvery (brownish on herbarium specimens), bristles minutely barbellate.

Distribution.—*Microseris laciniata* subsp. *detlingii* is endemic to a limited area east and south of Medford and Ashland, Jackson County, Oregon, extending north to near Butte Falls and south over Siskiyou Pass to the California state

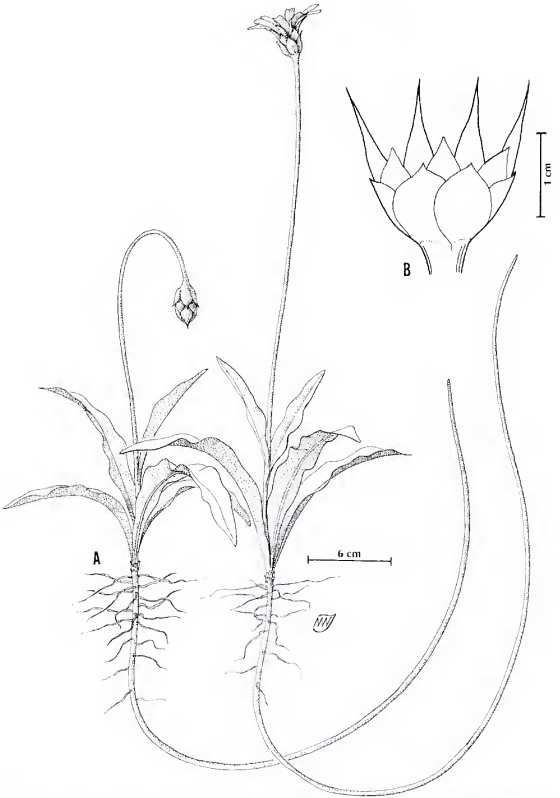

FIG. 4. *Microseris laciniata* subsp. *detlingii*. **A.** Habit of plant at anthesis. **B.** Pressed head showing phyllaries.

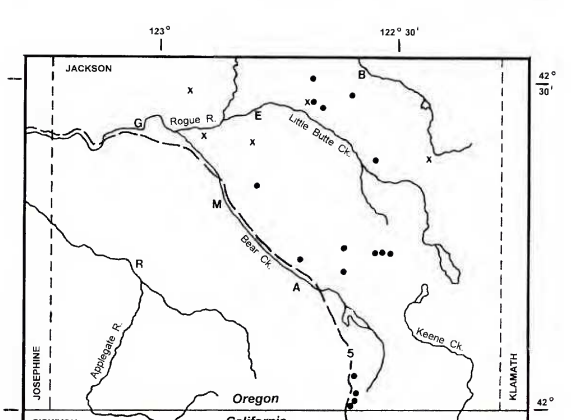

Fig. 5. Distribution of *Microseris* taxa in southern Jackson Co., OR and adjacent Siskiyou Co., CA. Black circles = *M. laciniata* subsp. *detlingii*; Xs = *M. laciniata* subsp. *laciniata*. Cities: A = Ashland; B = Butte Falls; E = Eagle Point; G = Gold Hill; H = Hornbrook; M = Medford; R = Ruch. Dashed line = Interstate Highway 5.

line (Fig. 5). One population has been found in adjacent Siskiyou County, California. The subspecies occurs only in montmorillonite clay soil, sticky when wet and hard and cracked when dry, on grassy slopes and openings in shrublands and forest edges. The geology of the type area, south of the summit of Siskiyou Pass, was included in the thesis of Richard Carlton (1972), who identified the underlying rocks at the type locality as fossil-bearing claystones and siltstones of the early Eocene Colestin Formation, lacustrine in origin and possessing clay minerals of the montmorillonite-mica type. Farther north, near Ashland and Medford, similar clay soil develops in younger Eocene deposits of volcanic-derived sedimentary rocks (McKnight 1971). The complex geology of this region also includes sandstones and volcanic lahar and ash-flow deposits. Adaptations of subsp. *detlingii* to this unusual substrate include an exceptionally deep, slender taproot (Fig. 4) and the ability to reproduce clonally by adventitious buds on the lateral rootlets. Colonies are often limited to patches of

loose soil turned up by gophers or squirrels. Associated species are *Pinus jeffreyi*, *Quercus breweri*, *Q. garryana*, *Amelanchier pallida*, *Ceanothus cuneatus*, *Arctostaphylos viscida*, *Toxicodendron diversifolium*, *Festuca idahoensis*, *Achnatherum lemmonii*. Elevations are 600–1450 m. Flowering occurs May–Jun.

Etymology.—The name is in honor of Prof. LeRoy Detling, longtime curator of the University of Oregon herbarium, whose 1950 collection first alerted the author to the peculiar features of this plant.

Figure 5 shows the limited distribution of subsp. *detlingii*, as well as the nearby occurrence of populations, marked by Xs, which the author places in subsp. *laciniata*. The latter specimens, listed below, occur on substrates other than the "heavy clay soil" or "rocky clay soil" consistently mentioned on the labels of subsp. *detlingii* specimens. North of Medford, subsp. *laciniata* is found on rocky alluvium, as at the Agate Desert (*Chambers 3080*), and differs from subsp. *detlingii* in having pinnate leaves, multiple arched-ascending stems from the base, consistently 10 pappi, and lacking an unusually elongate taproot. However, the pappi scales are up to 4 mm long, nearly twice the usual range of subsp. *laciniata*, and are barbellulate. On Kanutchan Creek just north of Little Butte Creek, collections by Greenleaf (*1418, 1435*) contain both subsp. *detlingii* and plants with highly pinnatifid leaves and basal branching like that of subsp. *laciniata* at Agate Desert. The habitat is described as *Quercus garryana/Pinus ponderosa/Arbutus menziesii* woodland. We expect that more intergradation will be found between the two subspecies in this area, depending on soil type and disturbance, for example by erosion and cattle grazing. A pappus member of subsp. *detlingii* is shown in Figure 2B, where it is compared with both subsp. *siskiyouensis* and with the common type in subspp. *leptosepala* and *laciniata*.

Collections of *Microseris laciniata* subsp. *detlingii* mapped in Figure 5. **U.S.A. CALIFORNIA. Siskiyou Co.:** Copco Rd. W of Iron Gate Reservoir, 1.2 mi N of Klamath R. bridge at Iron Gate Dam, 16 Jun 1998, *Chambers 6132* (OSC, UC). **OREGON. Jackson Co.:** High hills opposite Ashland, Jun 1889, *Howell s.n.* (MIN, MSC, ORE, UC, US); slope of Grizzly Peak, 17 Jul 1913, *Peck 7667* (WILLU); Klamath Hwy. 7 mi SE of Ashland, 19 Jun 1927, *Peck 15000* (WILLU); S slope of Siskiyou Mtns. near California line, 12 Jun 1930, *Henderson 13256* (ORE); Siskiyou Pass, T41S, R2E, S8, 11 Jun 1950, *Detling 6635* (DS, ORE, UC, WTU); Dead Indian Memorial Rd. E of Ashland, T39S., R2E, S5, 23 May 1995, *Straw 3274* (SOC); Round Top RNA, T35S, R1E, S15, 25 Jun 1997, *Wineteer s.n.* (SOC); Kanutchan Ck., T35S., R1E, S27, 31 May 1983, *Greenleaf 1435* (OSC); Dead Indian Memorial Rd. E of Ashland, T38S, R2E, S24, 9 Jul 1982, *Kagan s.n.* (OSC); S of Butler Ck., hills N of Ashland, 9 May 1993, *Brock 486* (OSC); W slope of Roxy Ann Pk. E of Medford, 30 May 1993, *Brock 496* (OSC); Lick Ck., T36S, R1E, S1, *Brock 797* (OSC); Heppsie Mtn., T37S, R2E, S2, *Brock 807b* (OSC); Lick Ck., T35S, R2E, S29, 14 Jun 2001, *Knapp 614001* (OSC); Old Siskiyou Pass Rd., 3.5 mi S of summit at junction with Hwy. 5, 29 May 1965, *Chambers 2348* (OSC); Old Siskiyou Pass Rd. 0.7 mi N of junction with Hwy. 5, 22 Jun 1967, *Chambers 2869* (OSC); Old Siskiyou Pass Rd. 2.7 mi N of junction with Hwy. 5, 22 Jun 1967, *Chambers 2870* (OSC); Siskiyou Pass summit on the old road, T40S, R2E, S32-33, 13 Jul 1978, *Chambers 4524* (OSC); Siskiyou Pass, S side, on abandoned stretch of old road ca. 0.25 mi N of California state line, 16 Jun 1998, *Chambers 6131* (OSC).

Collections of *Microseris laciniata* subsp. *laciniata* mapped in Figures 3 and 5. **U.S.A. OREGON. Jack-**

son Co.: Sam's Valley N of Medford, 4 May 1930, *Henderson 12388, 13253* (ORE); 5 mi W of Fish Lake, T36S, R3E, S35, 27 Jul 1989, *Rolle 280* (OSC); Kanutchan Ck. ca. 4 mi E of Eagle Point, 26 May 1983, *Greenleaf 1418* (OSC); Sam's Valley, T35S, R2W, S32, 6 May 1961, *Chambers 1601* (OSC); 2.5 mi E of Hwy. 62, White City N of Medford, 16 May 1971, *Chambers 3044* (OSC); Agate Desert N of Medford, Kirtland Rd. 1 mi W of Table Rock Rd., 16 May 1971, *Chambers 3080* (OSC). **Josephine Co.:** Fish Hatchery Rd. 0.7 mi W of New Hope Rd. S of Grants Pass, 14 Jun 1998, *Chambers 6105* (OSC).

DISCUSSION

The Klamath Region, including the Siskiyou Mountains, has long been recognized as an area of high endemism and as a center of floristic diversity (Whittaker 1961). Factors favoring this diversity, mentioned by Whittaker, include a steep climatic gradient from the coast inland, high rainfall and moderate temperatures, much-dissected topography, and diversity of bedrock, and hence of soil types. The complex geological history and origin of the varying substrates are described by Coleman and Kruckeberg (1999). Types of endemism and an analysis of the endemic flora were presented by Smith and Sawyer (1988). These authors list the two taxa newly described here, whose names were available on herbarium annotations, and also *Microseris howellii*, a previously named endemic of serpentine barrens in the Illinois River valley of Josephine County, Oregon. This species, and the other *Microseris* taxa mentioned above, illustrate very well the importance of edaphic and climatic factors in keeping separate the parapatric members of this complex.

Proceeding from west to east, *Microseris laciniata* subsp. *leptosepala* occupies the more coastal region of Curry County and is found on serpentine barrens as well as non-serpentine meadows and forest edges. The peculiar vegetation and characteristic flora on serpentine barrens in the Siskiyous are discussed in Coleman and Kruckeberg (1999). Examples of serpentine sites among the specimens of subsp. *leptosepala* cited above are Pine Point (*Hawk s.n.*), Gold Beach to Agness road (*Chambers 5162, Stansell s.n.*), Signal Buttes (*Stansell s.n.*), S of Gold Beach (*Sundberg 1098*), Buckskin Peak (*Rolle 256*), and 7 miles W of O'Brien (*Kagan s.n.*). Endemic to serpentine barrens farther east in the Illinois River valley is *M. howellii*, a close relative of *M. laciniata*, having 5–10 pappi but differing in its pappi scales 3–5 mm long. Parapatric in Oregon with *M. howellii* is *M. laciniata* subsp. *siskiyouensis*, which avoids open, rocky serpentine barrens but occurs in adjacent forested sites in loam soil. No hybrid populations have been noted between these two taxa. To the east, *M. laciniata* subsp. *laciniata* is on alluvial and deeper loam soils in grasslands and mixed oak woodlands near the Rogue River. Finally, *M. laciniata* subsp. *detlingii* is endemic to montmorillonite clay soils from 600–1450 m elevation in the Medford-Siskiyou Pass area.

The differentiation of *Microseris* taxa in the Siskiyous, and their maintenance as genetically separate populations, has involved both an adaptation to different substrates and a geographical separation into different climatic zones.

This has led to an unusual richness of species and subspecies in this limited region of southwestern Oregon and adjacent California, which is in line with the frequently mentioned floristic diversity of the Klamath-Siskiyou Mountains in general.

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